he U.S. National Arboretum in Washington, D.C., is a unique installation in the Agricultural Research Service. Of around 100 ARS locations worldwide, it is the only one that serves as an education center and national garden, as well as a federal research laboratory. This year, the U.S. National Arboretum, one of the largest arboretums in the country and the only federally funded

one, celebrates its 70th anniversary.

The anniversary celebration began in March with the unveiling of "Celebrating Science: 70 Years of Discovery" by arboretum director Thomas S. Elias. "This exhibit highlights the many accomplishments of the arboretum since it was established," he says.



Plant breeder Gail Littlejohn (right) explains the growth habit of Fynbos plants to U.S. Department of Agriculture Secretary Dan Glickman (second from right) and members of the U.S.-Republic of South Africa Binational Commission's agriculture committee.

The celebration continues this fall with special exhibits of fresh and dried floral plants, highlighting exotic and rare cut and potted plants from South Africa. Sponsored jointly by USDA's Agricultural Research Service, the South African Embassy,

and the Agricultural Research Council (ARC) of South Africa, the month-long autumn exhibition will showcase the great floral diversity of South Africa and the progress of mutually beneficial collaborative activities.

According to Elias, one of the highlights of the exhibit will be the introduction of potted bulbs of a new *Ornithogalum*. It was developed and named by re-

searchers at the ARC Fynbos (pronounced FINN-bose) Unit near Cape Town. These plants will be brought from South Africa by a contingent of the country's representatives.

"South Africa is noted for its tremendous diversity and richness of flowering plants—like nowhere else

Floral

Binational Cooperation Yields a Wealth of New Blooms for America's Markets

The 70th anniversary celebration of the U.S. National Arboretum highlights plants from South Africa.

on the planet," says Elias. "It's especially rich in an assortment of bulb plants such as gladiolus and amaryllis. Several South African plants well known to U.S. gardeners—members of the genera *Gerbera, Sansevieria, Aloe, and Plumbago*—will be featured in the exhibit."

Unusually Varied Flora

Although South Africa occupies less than 1 percent of the world's land mass, it contains 10 percent of all the Earth's species of plants. In an

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area smaller than Vermont, the so-called Cape Floral Kingdom hosts more than 8,600 plant species, 5,800 of which are unique to the area.

South Africa has a third of the world's succulent plant species, over 2,000 *Mesembryan-themaceae* species, and

more than 100 *Pelargonium* (geranium) species.

"The South African exhibit will feature plants that show the area's unique diversity and richness of flowering plants," says Elias. "Especially interesting is the incredible assortment of exotic bulb plants. Many are virtually unknown to U.S. growers, nurseries, and consumers."

According to Ruxton H. Villet, ARS Deputy Assistant Administrator for international programs, "In 1995, nine animal and plant projects with South Africa were implemented by ARS and funded by the U.S. Agency for International Development. Their objective is to develop small-scale farming with high-value agriproducts that could lead to small business enterprise in rural areas. Ornamental plants is one area of focus."

This year, ARS will begin a cooperative project with South Africa to develop and introduce these many new plants to U.S. consumers.

The project's mission:

- Identify high-potential plants for cooperative research with South African scientists;
 - Develop them as new ornamentals and cut flowers for South African small farmers;
 - Introduce the new plants into U.S. markets.

A cultivated member of the Protea family, Leucadendron discolor

The "Floral Gems: Blossoming Wealth of South Africa" exhibit will be open to the public from 8 a.m. to 5 p.m. daily, October 17 through November 16, 1997, at the U.S. National Arboretum located at 3501 New York Avenue, NE, Washington, D.C. "What's disconcerting," says Elias, "is that about 1,700 of the 8,600 flowering plants indigenous to the Cape are listed as being critically rare, endangered, or vulnerable. An appalling 29 of these are known to have already become extinct." This loss is the result of alien plant invasion, uncontrolled fires, injudicious flower picking—as well as agricultural and urban expansion.

But because of the great variety of plants and animals found in South

Africa, important segments have been protected by an extensive national park system and progressive conservation practices.

Visitors to the arboretum exhibit will discover the seven major types of ecological

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communities, or biomes, in South Africa. They are forest, thicket, grassland, savanna, nama karoo, succulent karoo, and the fynbos. Much of the country's floral diversity is found in the Cape region in the fynbos (Dutch for fine-leafed plants) biome.

A Magical, Botanical Land

The Cape Floral Kingdom, or Fynbos, contains an exceptionally

diverse and biologically unique flora. The Fynbos comprises about 17,000 square miles of the southern and southwestern Cape. It is located at the southernmost tip of Africa, where the Indian and Atlantic Oceans meet.

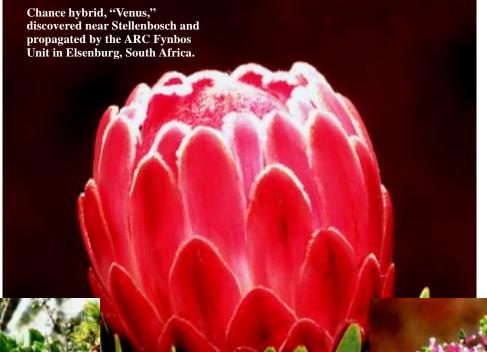
The Cape Floral Kingdom is both the smallest and richest floral kingdom, with the highest known concentration of plant species about 1,300 per 4,000 square miles. Its nearest rival, the South American

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rain forest, has a concentration of only 400 plants per 4,000 square miles. The total world range of some of these plant species is an area smaller than half a soccer field.

Fynbos vegetation is an unusual mixture

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South African Pelargonium, commonly known as a geranium.

A bouquet of *Erica* flowers.

of plant types of different shapes and sizes, though trees are rare in natural fynbos. Four plant growth types occur: tall protea shrubs with large leaves, called proteoids; heathlike shrubs, the ericoids; wiry, reedlike plants, called restioids; and bulbous herbs, or geophytes.

The abundant ericoids comprise more than 3,000 species, including the 627 different species of the Erica family. Erica species are used in the international horticultural trade as potted plants. Currently in South Africa, Ericas are harvested only in the wild for the cut flower industry.

ARS and ARC will begin a 3-year study in 1998 to develop new potted plants of Erica species, Elias says.

Restioids, members of the Restionaceae family, resemble reeds or rushes and consist of 310 species that include *Elegia* (32 species). Potted plants of this interesting South African family will be part of the

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Bird of Paradise, one of South Africa's many contributions to the ornamental nursery and floral industries.

arboretum exhibit. "These plants are a new substitute for ornamental grasses," says Elias.

South Africa has the richest geophyte flora in the world. It is home to over 2,000 flowering bulb species, of which more than 1,400 are found in the Cape Floral Kingdom. Many of these bulbous species have been collected by visiting botanists and then cultivated in foreign countries. They include some of the most popular bulbous plants in the world,

belonging to genera like *Freesia* (iris family), *Nerine* (amaryllis family), and *Gladiolus*.

Elias says that South Africa has 96 of the 160 *Gladiolus* species found throughout the world. "The country also boasts 88 recorded species of the lily *Lachenalia*, out of an estimated world total of 110. Several examples of new *Lachenalia* hybrids developed by the ARC-Roodeplaat in Pretoria will be displayed at the arboretum," says Elias.

A Boon to Small Growers

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Realizing the inherent potential of small-scale floriculture farming to improve the economic situation of previously disadvantaged people, ARC has redirected the focus of its Fynbos Unit. "This unit has taken the lead in applying science, together with economics and community development, to form a comprehensive regional approach to conservation," says Villet.



King Protea, *Protea cynaroides*, the national flower of South Africa.



Aloe growing in the wild in the Drakensberg Mountains of South Africa.



Red pincushion protea, Leucospermum cordifolium.

Flowers most commonly associated with the Fynbos are proteas. Aptly named after the Greek god Proteus, who could assume many different forms at will, proteas come in many shapes and sizes.

Native to the southern hemisphere, the proteas found in South Africa number about half of those found in the world. The curious diversity in form and color of the *Proteaceae* is evident in the majestic King Protea, *P. cynaroides*, which is the South African floral emblem; the delicate Blushing Bride, *Serruria*; the fascinating Pincushions, *Leucospermum*; and the Cone Bushes, *Leucadendron*.

"The flowers and fruits of certain proteas are attractive and unusual in form and color, making them ideal for fresh or dried flowers and for use in artistic arrangements," says Elias.

In all, South Africa has 15 indigenous genera and more than 400 species. Over 50 different cultivated

forms of proteas will be featured in the arboretum exhibit.

Says Villet, "South Africa's diverse and beautiful groups of flowering plants can bring excellent prices in international markets. But there are problems.

"The wildflower industry in the western Cape has a long history. Fresh and dried flowers, valued at about \$20 million a year, are exported annually to Europe and the East and involve about 20,000 people dependent on the industry. But since flowers are still largely picked from plants in the natural habitat, this ultimately has a negative environmental effect," says Villet. "And the product rarely meets the stringent quality requirements for global markets."

So ARS, in collaboration with the ARC Fynbos Unit, is working to codevelop technologies that will permit establishment of cultivation systems leading to high productivity and qualTHOMAS S. ELIAS



Spring wildflowers bloom along the Cape of Good Hope coast near Cape Town, South Africa.

ity that meet exacting standards required for international trading.

The unit has set up well-organized programs to train small farmers. It also has an active research and development program to boost the industry. The collaboration with ARS will lead to new cultivars, new links with U.S. industry, and environmentally

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Leucadendron, an indigenous member of the Protea family.

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Watsonia, a common bulbous herb.

satisfactory farming operations in South Africa, says Villet.

"It is important to have an efficient chain of operations—from production to processing and from packaging to marketing. The Fynbos Unit provides expertise and guidance in production and processing; the small farmers have taken the responsibility on themselves for marketing their attractive products," he says.

And We Gain, Too

Elias says the South African cooperative research program is "another step in the arboretum's mission; that is, to develop and implement new and innovative technologies for U.S. floral and nursery industries—to keep them competitive in world markets."

Over the years, the arboretum has genetically improved major cut flowers and flowering plants, including carnations, chrysanthemums, gladioli, hydrangeas, irises, lilies, poinsettias, roses, and many other plants.

"During the last 10 years, the laboratory has developed several new research programs involving both basic and applied research to improve floral crops," says Elias. "The result has been development of many new technologies in tissue culture, biotechnology, and entomology—as well as new floral and nursery plants.—By **Hank Becker**, ARS.

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Cooperation Begins at Highest Levels

Research cooperation between the Agricultural Research Service and its South African counterpart, the Agricultural Research Council, had its beginnings in a U.S.-Republic of South Africa Binational Commission that Vice President Al Gore and South African Deputy President Thabo Mbeki signed into being in 1994.

The agreement provided a framework to facilitate collaboration in business development, energy, the environment, human resources and education, and science and technology that would be of benefit to both countries and help enhance the stability of democracy in South Africa. Agriculture was added as a specific focus in 1995.

Exchanges of scientists, coordinated research projects, joint seminars, shared research facilities, and other partnerships between ARS and ARC are all encouraged under the Binational Commission. Current projects include commercialization of indigenous goat farming products, developing high-value indigenous ornamental plants, and enhancing earnings for small-scale farming.

Other partnerships have been created to help enhance small-scale farming between ARS and other South African institutions including universities, small farm cooperatives, and local businesses, as well as the Ministry of Agriculture and Land Development. Many projects involve developing high-value products such as novel biopesticides for sustainable agriculture.

